

中国特种动物皮革和毛皮

A COLLECTION OF HISTOLOGICAL
FIGURES OF CHINESE GOATSKINS

CHINA LIGHT INDUSTRY PRESS

北京轻工业出版社





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中国山羊皮革组织学图谱

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著

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by

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轻工业出版社出版

(北京朝阳区黄寺大街甲3号)

北京胶印厂印刷

新华书店北京发行所发行

各地新华书店经售

787×1092毫米 1/16 印张:13 4/16 字数:297千字

1990年6月 第一版第一次印刷

印数: 1—1000 定价: 82.00元

ISBN 7—5019—0734—X/TS·0474

内容提要

《中国山羊皮革组织学图谱》是国家“六·五”和“七·五”科技攻关课题,经过 10 年的艰苦努力,终于较全面、系统地掌握了中国山羊皮组织构造的特点及在生产过程中的变化。该书是国内外唯一全面研究中国山羊皮革组织学的书籍。书中选用了 353 张代表性极强的黑白、彩色照片,并配有中英文说明。全书分三部分:第一部分,生皮组织构造;第二部分,山羊皮在正鞋面革制造过程中微观结构的变化;第三部分,山羊皮在正面服装革生产过程中微观结构的变化。

前 言

皮革组织学是通过光学显微镜和电子显微镜研究皮和革在微观领域内的组织形态及结构,以及它们在加工过程中变化的科学。

皮革组织学,利用组织切片技术在光学显微镜下观察生皮中的表皮、真皮、真皮中的乳头层、网状层,以及真皮内的毛囊、汗腺、脂腺、肌肉组织等的形貌和分布状态,胶原纤维束及胶原纤维、弹性纤维等的形态、编织方式。利用超薄切片技术,用透射电子显微镜观察构成基元纤维(即纤维)的原纤维(即微纤维)的聚集和松散状态,以及明暗带的结构等。由于扫描电子显微镜制样技术比石蜡切片和超薄技术简单,观察样品的尺寸较大,图象放大倍数范围大,分辨率较高,图象富有立体感。因此,在皮革组织学研究中获得了广泛的应用。

我国山羊皮资源丰富,品质优良,举世闻名。国家十分重视山羊皮制革技术的开发研究。从 60 年代起,潘津生教授就开始了华北路河北省山羊皮组织构造的研究,在“六·五”和“七·五”期间,山羊皮组织学的研究均被列入国家科技攻关项目课题,并由西北轻工业学院承担了“提高汉口路山羊皮革质量的研究”和“华北路山羊皮制革技术开发”组织学部分研究任务。经过近 10 年艰苦的努力,系统地研究了汉口路山羊皮和华北路山羊皮组织构造,及其在加工过程中的变化,同时,对四川路麻羊皮,济宁路山羊皮,云贵路四川省西昌山羊皮也进行了一般组织构造的研究。为了使科研成果尽快在生产中发挥作用,也为了使其他交叉学科在科研中进行参考,我们将研究成果写成《中国山羊皮革组织学图谱》。本书较全面、系统地介绍了中国山羊皮革组织学:生皮、加工过程及成品革的特点。书中选用了 300 余幅彩色及黑白图片,并配有中、英文解释。分述了我国山羊皮一般组织构造,各路分山羊皮组织构造的特征,以及山羊皮在正鞋面革和正面服装革加工过程中微观结构的变化,集中反映了我国山羊皮革组织学研究的最新成果。

参加本书图谱制片工作的有魏世林副教授,韩玉香实验师,章川波副教授,刘镇华讲师,谢石平讲师。第一部分,生皮组织构造由魏世林和韩玉香整理;第二部分,山羊皮在正鞋面革制造过程中微观结构的变化由章川波整理;第三部分,山羊皮在正面服装革加工过程中微观结构的变化由刘镇华整理;谢石平负责英文翻译工作;全书由潘津生教授审阅。

在《图谱》的编写过程中,得到了西北轻工业学院、轻工部毛皮制革工业研究所、河南省新乡制革厂、开封制革厂、河南省皮革塑料研究所及参加生产工艺研究的有关同志的支持和帮助,在此表示衷心的感谢。

著 者

1989 年 3 月 30 日

PREFACE

In the histology of skins, hides and leathers, their histological characteristics are studied under light microscopes and/or electron microscopes. The study also examines the histological changes of the skins or hides in the leather manufacture.

After sample preparation, the following parts of the skins or hides can be observed under a light microscope: epidermis, dermis, the papillary layer and the reticular layer in the dermis. The form and distribution of the various tissues inside the dermis can be examined, too. The tissues include hair follicles, sudoriferous glands, sebaceous glands and muscles. The observable components also include collagenous fiber and fiber bundles, and elastic fibers. The pattern in which these fibers are interwoven can be studied with a light microscope. The sections prepared in an ultra microtome can be examined under a transmission electron microscope so as to study the association and the splitting-up of the collagenous fibrils, which are the basic unit in any higher order of the related components, for instance, the elementary fibers, i.e. the fibers, and the fiber bundles. The characteristic periodical cross-striations on the fibrils are also examined under the electron microscope. Another type of electron microscope, the scanning electron microscope has some advantages over other types of microscopes. The sample preparation is easier than paraffin embedding and the ultra microtome technique. The great size of the sample, wide range of magnification, great resolving power and the stereoscopic images have all justified the wide use of scanning electron microscopes in the histological study of skins, hides and leather.

With a rich resource and high quality, Chinese goatskins are well-known in the world. The state government has put a great emphasis on the development of new technique in goat leather production. As early as in 1960's, Professor Pan Jinsheng began the histological study of the Huabei goatskins from Hebei Province. In the Sixth and the Seventh State Five-year Development Plan, the histological study of goatskins was and is now among the important programs sponsored by the state government. The Northwest Institute of Light Industry was designated to undertake the histological part of the following projects: Improvement of Hankow Goat Leather, and Development of New Technique for Huabei Goat Leather Manufacture. For nearly ten years, systematic study has been done on the histological characteristics of the Hankow and the Huabei goatskins and their changes during the leather manufacturing. Apart from that, general histological study has been done on the following breeds of goatskins: Ma goatskins from Sichuan Province, Jining goatskins, Yungui goatskins from Xicang of Sichuan Province. To facilitate the application of the study results to production and to offer a reference to other related studies, the study results are now compiled in the Collection. A fairly thorough and systematic introduction has been made of the histological characteristics of Chinese goatskins and leather: fresh skins, semi-manufactured skins and leather. Over 300 figures, colour or black and white, have been collected and presented in English as well as in Chinese. Apart from the general histology of the Chinese goatskins, particular skins from various regions, and the changes of the skins in the manufacture of shoe upper and garment leather have all been studied and collected. We believe that this Collection can reflect the up-to-date results of the histological study on Chinese goatskins.

Five contributors from the Northwest Institute of Light Industry have been engaged in the preparation of the figures in this Collection. They are Wei Shiling (Associate Professor), Han Yuxiang Laboratory Technician), Zhang Chuanbo (Associate Professor), Liu Zhenhua (Lecturer) and Xie Shiping (Lecturer). The first part, Histology of Fresh Goatskins has been compiled by Wei Shiling and Han Yuxiang. The second part, The Histological Changes of Goatskins in Manufacture of Upper Goat Leather, has been compiled by Zhang Chuanbo. The third part, The Histological Changes of Goatskins in Manufacture of Garment Leather, has been compiled by Liu Zhenhua. Xie Shiping has translated the Collection into English. Professor Pan Jinsheng has read and edited the Collection.

The authors

ACKNOWLEDGEMENTS

We wish to acknowledge our debt to many people from the following units for their great and enthusiastic support and help in the compiling of the Collection: Institute of Fur and Leather Industry affiliated to the Ministry of Light Industry; Xinxiang Tannery and Kaifeng Tannery in Henan Province; Institute of Leather and Plastics Industry of Henan Province; Northwest Institute of Light Industry.

April

1989

The authors

说 明

山羊皮革组织学研究常采用光学显微镜和电子显微镜观察制成的试样切片或样块。试样制备方法如下:

1、光学显微镜观察制样方法

(1)固定:山羊鲜皮试样通常用波因(Bouin)液固定;山羊半制品试样,如浸水皮、浸灰皮、软化皮、浸酸皮通常用10%甲醛溶液固定。固定时间一般为24h。

(2)切片:冰冻切片法,采用国产DLQ型生物半导体冰冻切片机,切片厚度20~25 μm 。

(3)染色:①表皮细胞组织采用苏木伊红染色法染色;②胶原纤维采用铁苏木染色法或三色法染色;③弹性纤维采用地衣红染色法或威氏(Weigert)染色法染色;④脂腺及脂肪细胞在三色染色法中用苏丹IV染色。

在三色染色法染色的山羊皮组织构造的切片上,胶原纤维染成蓝色,表皮组织呈桔黄色,脂腺及脂肪细胞呈鲜红色,染色的切片常用阿拉伯胶封固;用苏木伊红染色法染色,胶原纤维呈红色,细胞核呈蓝色;用地衣红法染色,弹性纤维呈红色。用威氏法染色,弹性纤维呈蓝黑色。用上述方法染色的切片常用香胶封固。制成的试样切片,在光学显微镜下观察和拍照。

2、扫描电子显微镜观察制样方法

山羊鲜皮或山羊半制品湿试样通常用戊二醛缓冲溶液固定,经梯度酒精脱水,醋酸异戊酯置换,临界点干燥后,进行离子溅射喷金;对于干山羊皮革试样如铬鞣坏革、复鞣坏革以及涂饰了的革,可直接进行离子溅射喷金。试样制成后用JEOL-JSM-35CF扫描电子显微镜观察和拍照。

3、透射电子显微镜观察制样方法

样块经生理食盐水洗涤后,用4%戊二醛缓冲液固定,通过梯度酒精脱水,树脂(主要是Epon 812)包埋,超薄切片机(LKB V型或Nova型)切片,用铅盐染色。对于弹性纤维切片,采用单宁酸染色。单根纤维用匀浆器分散,上网后以磷钨酸、醋酸双氧铀进行负染色。试样制成后用JEOL-100CX透射电子显微镜观察和拍照。

INTRODUCTION

In histological study of goatskins, the prepared specimen are examined under a light microscope, or/and electron microscope. The following is a brief introduction of the specimen preparation.

1. Specimens for light microscope observation

(1) Fixation: Fresh skins are fixed by Bouin's fluid. semi-manufactured skins, for example, soaked, limed, bated and pickled skins, are fixed by formaldehyde of a concentration of 10%. The fixation time is about 24 hours.

(2) Sectioning: Sections with the thickness of 20—25 μm are sectioned from skinpieces in a DLQ Freezing Microtome For Biological Samples.

(3) Staining: Epidermal cells are stained by Haematoxylin and Eosin method. Collagenous fibers are stained by trichrome staining method or iron haematoxylin method. For the staining of elastic fibers, orcein or Weigert's staining method is used. Trichrome and Sudan staining method is employed for sebaceous glands and cells.

When skin sections are stained with trichrome, the collagenous fibers are stained in blue, epidermal tissue in orange yellow, sebaceous glands or cells in bright red. Stained with iron haematoxylin, the collagenous fibers are red. Haematoxylin and eosin together will stain the collagenous fibers red. Elastic fibers are stained red by orcein, and blue black by Weigert's staining method. The stained sections are sealed by Arabic gum. For other staining methods the sections are sealed by balsam.

2. Specimens for scanning electron microscope

Fresh or semi-manufactured skinpieces are fixed by buffered glutaraldehyde. The fixed skinpieces are then dehydrated gradually in a series of alcohol liquors of increasing strength. The dehydrated specimens are transitioned to isoamyl acetate and then dried in a critical point dryer. The dried specimens are rendered electric conductivity through Au ion sputtering. For dry leather like chrome-tanned crust leather, retanned crust leather or finished leather, specimens can be sputtered directly. The prepared specimens are observed under a JEOL-JSM-35CF Scanning Electron Microscope.

3. Specimens for transmission electron microscope

The samples are fixed by 4% glutaraldehyde, and then by 1% osmium tetroxide. They are then gradually dehydrated with a series of alcohol of increasing concentration and embedded with Epon 812. Ultrathin sections are made in a LKB-Nova Microtome from the embedded specimens. Lead salt is used to stain the sections. The sections for the observation of elastic fibers are stained with tannic acid. Uranyl acetate and phosphotungstic acid are used to stain collagenous fibril specimens, which have been obtained in a grainer. The specimens are finally observed in a JEOL-100CX Transmission Electron Microscope.

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九、 Histological comparison of the leather without setting-out and with the leather set-out through a hot cylinder before finishing

十、 Histological comparison of the leather finished with the following finishes respectively. KS₂, Langro-v, KS₂-Langro-v, acrylic resin

十一、 Fiber structure and the handle and appearance quality of garment leather

- (一) Fiber structure on the vertical sections
- (二) Handle and appearance quality

第一部分 生皮组织构造

PART 1 HISTOLOGY OF FRESH GOATSKINS

一 中国山羊皮资源

幅远辽阔的领土,繁荣茂盛的天然草场,为养羊业提供了有利的条件。我国养羊业历史悠久,资源丰富,只山羊一个品种就遍布全国。根据山羊的不同用途,可将山羊品种分为乳用山羊,毛皮用山羊,绒用、毛用山羊,综合用山羊。宁夏回族自治区中卫裘皮山羊和山东省济宁青山羊都是毛皮用山羊。西藏山羊、宁夏白绒山羊属绒用、毛用山羊类。成都麻山羊、河北武安山羊、陕南白山羊属综合用山羊类。

我国生产的山羊皮有山羊板皮、山羊绒皮和山羊羔皮(俗称猾子皮)三种。山羊板皮是我国重要的制革原料皮。近年来我国年山羊板皮产量约4,000多万张,和印度的产量大致相等。约占世界总产量的60%。根据传统经营习惯,结合收购、出口的实际情况,山羊板皮一般归纳为五个路分,即四川路、汉口路、华北路、济宁路、云贵路。其中以四川路和汉口路山羊板皮质量最好,在国际市场上颇负盛誉。

用山羊板皮可加工成鞋面革,质量好的山羊板皮可制成山羊打光苯胺革、锦羊革,是制造高级男女皮鞋的优质材料。用山羊板皮还可加工成软正鞋面革、软包袋革、箱包革、票夹革等。山羊板皮的另一重要用途是加工成高、中档服装革和手套革。

RESOURCES OF CHINESE GOATSKINS

In China broad land and luxuriant grassland have secured good natural conditions for goat and sheep raising. Goat raising has a long history in China and almost every region keeps its own goats. According to their raising purposes, goats can be classified into the following four kinds, goats for milk, goats for furs, goats for fine hair or large hair, and goats for comprehensive uses. Zhongwei goats, raised in Ningxia Hui Autonomous Region, and Qingshan goats, raised in Jining of Shandong Province, are examples of goats for furs, Tibet goats and White goats produced in Ningxia are instances of goats for fine and large hairs. Ma goats in Chendu, Wuan goats in Hebei Province and White goats in South Shaanxi Pnvince are all examples of goats for comprehensive uses.

The goatskins produced in China include dry skins, skins with dominant fine hair, and kidskins. Dry goatskins are important for Chinese leather industry. For the past years, China has seen an annual output of 40 million pieces of goatskins. This production, together with about the same output from India, accounts for about 60 percent of the world's goatskin production. According to administration customs in goatskin trade, dry goatskins can be divided into five kinds, that is, Sichuan, Hankow, Huabei (North-China), Jining and Yungui goatskins. The first two kinds are well-known in the world market.

Dry goatskins can be manufactured into upper leather for shoes, garments, bags and cases, gloves, and so on. Good goatskins are especially suitable for production of quality goat leather, for example, glazed Aniline leather and glazed kid leather.